PB-215 653

LOWER WILLAMETTE BASIN (OREGON). PRELIMINARY ECONOMIC RECONNAISSANCE AND ESTIMATE OF GROWTH, 1960-2010

Public Health Service
Portland, Oregon

September 1962

DISTRIBUTED BY:

NTIS

National Technical Information Service
U. S. DEPARTMENT OF COMMERCE
5285 Port Royal Road, Springfield Va. 22151

PB 215 653

WORKING PAPER NO. 30

COLUMBIA RIVER BASIN PROJECT
For Water Supply and Water Quality Management

LOWER WILLAMETTE BASIN (OREGON) PRELIMINARY ECONOMIC RECONNAISSANCE AND ESTIMATE OF GROWTH, 1960-2010

DATE: September 24, 1962

Prepared by KKS

Reviewed by _____

Approved by _____

DISTRIBUTION

Project Staff _____

Cooperating Agencies _____

General _____

Reproduced by
NATIONAL TECHNICAL
INFORMATION SERVICE
U S Department of Commerce
Springfield VA 22151

U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service
Region IX

Division of Water Supply and Pollution Control
Room 570 Pittock Block
Portland 5, Oregon

This working paper contains preliminary data and information primarily intended for internal use by the Columbia River Basin Project staff and cooperating agencies. The material presented in this paper has not been fully evaluated and should not be considered as final.

LOWER WILLAMETTE BASIN (OREGON)
PRELIMINARY ECONOMIC RECONNAISSANCE AND ESTIMATE OF GROWTH, 1960-2010

Table of Contents

INTRODUCTION	1
Purpose of This Analysis	1
Definition of the Area	1
Study Period	2
Limitations of This Analysis	2
PRESENT ECONOMIC BASE	2
Population	2
Industry	5
ESTIMATED FUTURE GROWTH	8
Factors Influencing Future Growth	8
Future Employment	11
Future Population	15

Prepared by: Economic Studies Group
Water Supply and Pollution Control Program, Pacific Northwest

September 1962

LOWER WILLAMETTE BASIN (OREGON)
PRELIMINARY ECONOMIC RECONNAISSANCE
AND ESTIMATE OF GROWTH, 1960-2010

INTRODUCTION

Purpose of This Analysis

This analysis is intended to provide a preliminary estimate of the economic potentials and anticipated growth of the subject area.

Definition of the Area

The Willamette River Basin divides conveniently into three parts: (1) the Lower Portion, comprising the Portland Metropolitan Area (Clackamas, Multnomah, and Washington Counties); (2) the Middle Portion, comprising Benton, Linn, Marion, Polk, and Yamhill Counties; and (3) the Upper Portion, comprising Lane County. This report is an analysis of the economy of the Lower Portion.

Physically, the eastern part of Multnomah County, comprising the area east of the Sandy River, lies outside the Willamette River Basin, draining into the Columbia River. However, because basic statistics are available on a county basis, all of Multnomah County is included in the study area. Since the portion of Multnomah County east of the Sandy River comprises less than one-half of one per cent of Multnomah County population, no significant distortion is involved. With this exception, the boundaries of the three-county area conform approximately to the Willamette Basin boundaries.

Study Period

The study period is the 50-year period 1960-2010, with an interim point at 1985.

Limitations of This Analysis

Two limitations apply to this study. The first is that it is intended only as a preliminary estimate of the outlook for the subject area's growth. Subsequently, in connection with the Columbia River Basin Project for Water Supply and Water Quality Management, an analysis will be made on an industry-by-industry basis of the growth potential in the various sub-basins. At that time, this preliminary estimate will be reviewed, and revised if necessary.

The second limitation is that this study is intended for use particularly in assessing future water needs. Emphasis has been placed on the analysis of those industries which make heavy demands upon the water resource. Other industries have been considered only insofar as they may have a significant effect on future population. For this reason, this study is not submitted as a detailed industrial forecast.

PRESENT ECONOMIC BASE

Population

Total population in the three counties of the Lower Willamette Basin, as of April 1960, was 728,000. Table I shows how this population was distributed among six sub-basins of the Lower Willamette Basin. The

principal "sub-basin," identified as the Willamette Main Stem, has been divided into four parts in order to help locate this large population more precisely.

Table I
POPULATION OF LOWER WILLAMETTE RIVER BASIN, BY SUB-BASIN, APRIL 1, 1960

Sub-Basin or Area	Estimated Population, Thousands
Willamette Main Stem	
All of Multnomah County (a)	523
Clackamas County west of Willamette River	23
Clackamas County east of Willamette River and north of Clackamas River Basin (b)	38
Oregon City and Abernethy and Beaver Creeks drainage	13
Tualatin River	
All of Washington County (c)	92
Clackamas River	
Portion of Clackamas County (d)	22
Sandy River	
Portion of Clackamas County (e)	3
Molalla River	
Portion of Clackamas County	10
Pudding River	
Portion of Clackamas County (f)	4
TOTAL, LOWER WILLAMETTE BASIN (3-county area)	728

(a) Includes portion of Multnomah County east of Sandy River, which had a population of 2,400 in 1960. Most of this population is along the Columbia River.
(b) Equivalent to census tracts C8 through C18, plus Johnson, Mt. Scott, and Kellogg Creeks drainage areas.
(c) See previous project review for Washington County.
(d) Includes City of Gladstone and communities of Park Place and Clackamas Heights.
(e) Includes only the portion of the Sandy River drainage in Clackamas County. The portion of the Sandy River basin in Multnomah County has been included in Multnomah County, shown above under "Willamette Main Stem."
(f) Includes only the portion of the Pudding River drainage in the Lower Willamette Basin. The other portion of the Pudding River drainage is included in Marion County, in the Middle Willamette Basin.

There were 23 incorporated places in the Lower Willamette Basin in 1960. These are shown in Table II, arranged according to the same sub-basin divisions as were used in Table I.

Table II
POPULATION, INCORPORATED PLACES, LOWER WILLAMETTE BASIN, APRIL 1, 1960
By Sub-Basin

Sub-Basin and Incorporated Place	Population
Willamette Main Stem	
Multnomah County:	
Portland	372,298
Gresham	3,944
Fairview	578
Troutdale	522
Wood Village	822
Clackamas County west of Willamette River:	
Oswego	8,906
West Linn	3,933
Clackamas County east of Willamette River and north of Clackamas River Basin:	
Milwaukie	9,099
Oregon City and Abernethy and Beaver Creeks drainage:	
Oregon City	7,996
Tualatin River	
Banks	347
Beaverton	5,937
Gaston	320
Cornelius	1,146
Forest Grove	5,628
Hillsboro	8,232
Sherwood	680
Tualatin	359
Clackamas River	
Estacada	957
Gladstone	3,854
Sandy River	
Sandy	1,147
Molalla River	
Canby	2,168
Molalla	1,501
Pudding River	
Barlow	85

Industry

The economy of the Lower Willamette Basin is more diversified than that of any other part of the state. While lumber and wood products, the mainstay of the economies of most parts of Oregon, is also the largest single manufacturing employment category in the Lower Willamette, employment in that industry represents only 17 per cent of all manufacturing employment and only three per cent of the total labor force. Food and kindred is the second most important manufacturing category, in terms of employment, representing 14 per cent of all manufacturing employment. The other 69 per cent of manufacturing employment is well diversified among the other manufacturing categories, as shown in Table III. A large portion of the area's employment is in service industries, reflecting the function of Portland as the service center for its region.

Table III

EMPLOYMENT, BY INDUSTRY, LOWER WILLAMETTE BASIN, 1950 and 1960 (a)

Source: U. S. Census of Population

Industry	Employment, thousands		Change in Employment, 1950-1960, thousands	Distribution of Employment per cent (b)	
	1950	1960		1950	1960
Total Labor Force	264.4	293.7	+29.3	100.0	100.0
Military	.7	1.5	+ .8	.3	.5
Unemployed	19.3	14.8	- 4.5	7.3	5.0
Industry not reported	2.9	8.9	+ 6.0	1.1	3.1
Classifiable employed civilian l.f.	241.5	268.5	+27.0	91.3	91.4
Agriculture	13.9	8.8	- 5.1	5.2	3.0
Forestry and fisheries	.7	.8	+ .1	.2	.3
Mining	.4	.2	- .2	.1	.1
Manufacturing, Total	45.8	57.7	+11.9	17.3	19.6
Lumber, wood products, furn. and fix.	12.6	9.6	- 3.0	4.8	3.3
Primary metals	3.2	3.7	+ .5	1.2	1.3
Fabricated metals	3.1	4.0	+ .9	1.2	1.4
Machinery, non-electric	2.8	4.6	+ 1.8	1.0	1.6
Electrical machinery	.7	4.3	+ 3.6	.3	1.4
Motor vehicles and equip.	.5	1.2	+ .7	.2	.4
Transportation equip. ex. motor veh.	.5	3.0	+ 2.5	.2	1.0
Other durables (c)	2.4	3.4	+ 1.0	.9	1.1
Food and kindred	5.9	8.3	+ 2.4	2.2	2.8
Textiles	2.3	2.1	- .2	.9	.7
Apparel and fabric. textiles	1.9	2.8	+ .9	.7	.9
Printing and publishing	4.6	4.6	0	1.7	1.6
Chemicals and allied	1.3	1.5	+ .2	.5	.5
Pulp and paper	3.2	3.8	+ .6	1.2	1.3
Other non-durables and mfr. n.e.c. (d)	.8	.8	0	.3	.3
Construction	18.5	17.2	- 1.3	7.0	5.9
R.R. Transportation	8.1	6.1	- 2.0	3.1	2.1
Truck transp. and warehousing	4.5	5.8	+ 1.3	1.7	2.0
Other transportation service	6.1	5.9	- .2	2.3	2.0
Communications	4.1	4.8	+ .7	1.6	1.6
Utilities ex. communications	4.6	4.9	+ .3	1.8	1.6
Wholesale trade	15.1	17.6	+ 2.5	5.7	6.0
Retail--Food	7.4	6.9	- .5	2.8	2.4
Retail--Eating and drinking	9.6	9.7	+ .1	3.6	3.3
Retail--all other	28.4	29.2	+ .8	10.8	9.9
Finance, Insurance, Real Estate	12.3	15.5	+ 3.2	4.7	5.3
Business service	3.0	3.9	+ .9	1.1	1.3
Repair service	5.1	5.0	- .1	1.9	1.7
Personal service (e)	18.2	17.5	- .7	6.9	6.0
Professional and related services (f)	15.5	22.5	+ 7.0	5.9	7.7
Education--government	5.5	11.1	+ 5.6	2.1	3.8
Education--non-government	3.2	3.8	+ .6	1.2	1.3
Public administration	11.5	13.6	+ 2.1	4.3	4.6

Notes to Table III

(a) As of April 1, Lower Willamette Basin includes all of Clackamas, Multnomah, and Washington Counties.
(b) Based on unrounded figures.
(c) Includes cement, pottery, glass, concrete, gypsum, plaster, stone and their products; professional and photographic equipment; watches and clocks.
(d) Includes petroleum refining; footwear; coal, tobacco, rubber and leather and their products. Also includes the "manufacturing not elsewhere classified" category, a small miscellaneous group.
(e) Includes private household workers; hotels, motels and lodging places; other personal services; and entertainment and recreation.
(f) Includes hospitals, medical, dental, welfare organizations, and other professional and related services.

ESTIMATED FUTURE GROWTH

Factors Influencing Future Growth

The Portland Region, defined to include all of Oregon plus five counties of southwestern Washington, had a population in 1960 of about 1.9 million, of which about 38 per cent was in the Lower Willamette Basin (Multnomah, Clackamas, and Washington Counties). This concentration of population is largely due to Portland's strategic location with reference to transportation services, both inland and ocean-going. On the basis of that strategic location, Portland's economy has evolved into the only diversified manufacturing economy in the Region, as well as the service-industry center for the Region. Anticipated future growth of the Lower Willamette Basin is expected to continue to reflect these characteristics.

In line with national trends, it is expected that the ratio of service industry jobs to manufacturing or "goods" jobs will increase in the future. Service industry categories whose employment in the Lower Willamette Basin increased most rapidly during 1950-60 will probably continue to show the greatest increases in the future. These include truck transportation and warehousing, wholesale trade, finance-insurance-real estate, professional services, education, and public administration. An important part of Portland's large service industry employment grows out of the city's being the regional headquarters for many aspects of the area's major resource-based activity, the timber-based industries.

In manufacturing, continued growth of population is expected to make possible the establishment of market-oriented plants for the production of goods formerly brought in from the East. Because such industries are not compelled to locate close to any particular resource, their selection of a site is difficult to predict with precision. However, the diversified economy of the Lower Willamette Basin and the availability there of ample industrial acreage and a large, experienced labor force suggest that this area will attract a substantial part of new manufacturing plants coming to the Region.

Some indication of which manufacturing categories are likely to experience the greatest relative growth in the future can be deduced from Table IV, which compares the distribution of the labor force in the Lower Willamette Basin with the distribution in the United States as a whole. Except for those industries whose location is oriented towards the site of a fixed resource, it can be assumed that, as population density grows in the Portland Region, both absolutely and relatively, the distribution of employment in the Region and particularly in its most diversified portion, the Lower Willamette Basin, will become more like that in the nation. On this basis, the comparative data in Table IV suggest that growth is particularly likely to occur in the following categories: machinery (both non-electrical and electrical); other durables, identified in the footnote to Table IV; textiles; apparel; and chemicals, except for those which are resource-oriented.

Table IV
COMPARATIVE DISTRIBUTION OF LABOR FORCE, BY INDUSTRY, APRIL 1960
(Per Cent of Total Labor Force)

Industry	Lower Willamette Basin (a)	United States
Agriculture	3.0	6.1
Forestry, fisheries, mining	.4	1.0
Manufacturing, Total	19.6	25.1
Lumber, wood prod., furn. and fixt.	3.3	1.6
Primary metals	1.3	1.8
Fabricated metals	1.4	1.8
Machinery, non-electric	1.6	2.2
Electric machinery (b)	1.4	2.1
Other durables (c)	2.5	4.5
Food and kindred	2.8	2.6
Textiles	.7	1.4
Apparel and fabricated textiles	.9	1.7
Printing and publishing	1.6	1.7
Chemicals and related	.5	1.2
Other non-durables and misc. mfr. (d)	1.6	2.5
Construction	5.9	5.5
Services (e)	65.6	54.8
Total, Employed Civilian Labor Force	94.5	92.5
Unemployed	5.0	5.0
Military	.5	2.5
Total Labor Force	100.0	100.0

(a) Includes all of Clackamas, Multnomah, and Washington Counties.
(b) Includes electronics and oscilloscopes.
(c) Includes motor vehicles and equipment; other transportation equipment, including shipbuilding; cement, pottery, glass, concrete, gypsum, plaster, stone and structural clay and their products; professional and photographic equipment; and watches and clocks.
(d) Includes pulp and paper and their products; petroleum refining; and petroleum, coal, tobacco, rubber and leather products. Also in the total shown is the "not elsewhere classified" manufacturing, a small miscellaneous category.
(e) Includes "industry not reported" category, representing about three per cent of the labor force.

Future Employment

Estimates of future population and industrial growth in the Portland Metropolitan Area have been made by the Portland City Planning Commission and the Portland Metropolitan Planning Commission and, for purposes of this preliminary report, the findings of those studies have been accepted as general guidelines.1/ In Land for Industry, the Portland Metropolitan Planning Commission gave estimates of changes in employment from 1959 to 1975 for each principal manufacturing category. With certain adjustments, the annual rates of growth indicated in that study have been applied to the 1960 U. S. census figures for manufacturing employment and extended to 1985 and to 2010, yielding the figures for manufacturing employment shown in Table V. The principal departure from this technique is in regard to "electrical machinery," which includes electronics and oscilloscopes. It is felt that the substantial rate of increase (about 7.2 per cent per year) adopted in Land for Industry for the period 1959-1975 is likely to decline during the 1985-2010 period. For that latter period, a rate of 3.3 per cent per year has been used. Also, in Table V, a small addition has been made to "other durables," on the assumption that the large growth projected in electrical machinery can be expected to lead to increased production of parts and supplies for the electronics industry.

1/ Economic Prospects, Portland City Planning Commission, an unpublished staff report made in 1957; Population Prospects, Portland Metropolitan Planning Commission, July 1960; Land for Industry, Portland Metropolitan Planning Commission, July 1960.

For purposes of the projection, it is assumed that total employment in agriculture, forestry, fisheries and mining will, for the group as a whole, remain in the future about what it is now. It is expected that the steep decline in agricultural employment will level off in the future, though agricultural employment will continue to decline as a percentage of total employment. Some decrease in agricultural employment may be offset by an increase in "mining," which includes the sand and gravel industry.

On the basis of employment projected for the "goods" industries, described above, Table V shows the derived employment in service industries, the projected total labor force, and the total population which may be supported by that labor force. It is assumed that service industry employment will increase relative to goods industries employment. This is a trend which appears to be strongly established in the national economy. The assumed increase in the service:goods ratio is already substantially above that for the U. S. as a whole. The ratio assumed between population and total labor force is approximately what it was in 1960 and also conforms closely to the ratio in the nation and in other metropolitan areas in 1960.

Table V

ILLUSTRATIVE DISTRIBUTION OF FUTURE EMPLOYMENT, BY INDUSTRY, LOWER WILLAMETTE BASI

Industry	Employment, thousands			
	1950	1960	1985	2010
Agriculture, forestry, fisheries, mining	15.0	9.8	10.0	10.0
Manufacturing, Total	45.8	57.7	112.4	202.8
Lumber, wood prod., furn. and fixt.	12.6	9.6	11.4	13.6
Primary metals (a)	3.2	3.7	6.5	11.5
Fabricated metals	3.1	4.0	6.9	11.5
Machinery, non-electric	2.8	4.6	8.5	15.8
Electric machinery (incl. electronics)	.7	4.3	24.5	54.8
Transportation equipment	1.0	4.2	8.2	16.0
Other durables (b)	2.4	3.4	9.0	20.0
Food and kindred	5.9	8.3	12.7	19.4
Textiles	2.3	2.1	3.6	6.1
Apparel	1.9	2.8	5.2	9.6
Printing and publishing	4.6	4.6	7.6	12.5
Chemicals and allied	1.3	1.5	2.5	4.1
Pulp and paper (c)	3.2	3.8	4.4	5.1
Other non-durables, and misc. mfr. (d)	.8	.8	1.4	2.4
Total, "Goods"	60.8	67.5	122.4	212.8
Ratio, Service industries to Goods	297%	298%	310%	320%
Service industries (includ. construction)	180.7	201.0	379.4	681.7
Goods plus Services employment	241.5	268.5	501.8	894.5
Ratio, military+unemployed+industry not reported to total Goods+Services	9.5%	9.4%	10%	10%
Military, Unemployed and Industry not reported	22.9	25.2	50.2	89.5
TOTAL LABOR FORCE	264.4	293.7	552.0	984.0
Ratio, Population to Total Labor Force	234%	248%	250%	250%
Population	619	728	1,380	2,460

(a) A report of the Bureau of Mines ("Trends and Outlook in the Pacific Northwest Aluminum Industry," Bureau of Mines information circular 8046, published 1962) estimates that aluminum production in the Pacific Northwest in 1980 will be about four times what it was in 1959. This rate of growth is more than double the rate of growth projected for employment in primary metals in Table V. It should be emphasized that Table V deals in employment only; substantial increase in productivity in many industries may lead to a much greater increase in output.

(other notes, next page)

(b) The "Other durables" group includes cement, pottery, glass, concrete, gypsum, plaster, stone, and structural clay and their products; professional and photographic equipment and supplies; and watches and clocks.
(c) This group includes not only pulp and paper manufacturing but also allied products converted from paper, such as envelopes and boxes. It is estimated that production of pulp will increase from about 1,100 tons per day in the three-county area in 1960 to about 1,300 tons per day in 1985 and 1,500 tons per day in 2010. Due to limitations on the availability of raw material, it is not expected that much, if any, of this expansion will occur in Washington County, where there is now a 70 tons-per-day fibreboard plant, near Forest Grove. Nor is much expansion expected at either West Linn or Oregon City because of physical limitations of the sites. It does seem likely from the standpoint of availability of raw materials and water supply that fibreboard production may be established in either the Clackamas, Pudding, or Molalla River basins. The national market demand for this type of product seems favorable, and the economics of the industry seem to favor location near the raw material.
(d) The "Other non-durables" group includes petroleum refining, footwear, and products made of petroleum, coal, tobacco, rubber and leather. Also in the total shown is the "not elsewhere classified" manufacturing, a small miscellaneous category.

Future Population

Two methods were used to arrive at an estimate of Lower Willamette Basin population in 1985 and 2010. One method was that shown in Table V, where the estimation of future population is built up from projections of future employment in the manufacturing and other "goods" industries and from assumptions concerning the ratios of "service" employment to "goods" employment and of population to the total labor force. The other method was to allocate to the various basins of Oregon the population forecast for the state in terms of national population trends, assuming that past trends in relative growth and in resource development in the various basins of the state would continue. In using the latter method of estimating, it was assumed that Oregon population would be 3.05 million in 1985 and 5.26 in 2010. These estimates of future state population are related to the "Series II" projection of national population,[1/] which assumes that fertility will remain in the future at the 1955-57 level.

Allocating the estimated future state population by sub-basin yields the following results for the Lower Willamette Basin's population: 1985, 1,380,000; 2010, 2,460,000. As shown in Table V, the method based on estimating future employment yields results which are consistent with those figures, using the ratios assumed in Table V.

It should be emphasized that the arbitrary nature of these estimates should be fully recognized. They are, however, based upon assumptions

1/ U. S. Census Bureau, Series P-25, No. 251, July 6, 1962.

which are considered to be "reasonable," and represent a "best guess" on the basis of data available for a preliminary economic reconnaissance.

An estimate of the distribution of future population among the various sub-basins of the Lower Willamette Basin must rest upon even more arbitrary assumptions than the projection for the larger area. However, an illustrative and hypothetical distribution, which is considered to be adequate for certain design purposes, is shown in Tables VI and VII. Table VI shows an illustrative distribution of future Lower Willamette Basin population among the three counties comprising the basin. Clackamas and Washington Counties constituted an increasing percentage of three-county population during the 1950-60 decade, and it is assumed that this trend will continue. This assumption is consistent with a report by the Portland Metropolitan Planning Commission (Population Prospects, July 1960), whose population percentage distribution for 1975 is shown in Table VI. In extending trends beyond 1975, it is assumed here that, as Clackamas and Washington Counties become more densely populated, their gain in population relative to Multnomah County will become less pronounced. As the population density in Clackamas and Washington County becomes more like that in Multnomah County, growth rates will tend to be more uniform in the three counties.

On the basis of the percentage distribution of population among the three counties shown in Table VI, Table VII distributes the indicated county population further, that is, among the various sub-basins as shown in Table I.

Table VI
PERCENTAGE DISTRIBUTION OF LOWER WILLAMETTE BASIN POPULATION BY COUNTY

County	Share of Lower Willamette Basin Population, per cent				
	1950	1960	1975(a)	1985	2010
Clackamas	14.0	15.5	18.7	20.2	21.2
Multnomah	76.1	71.8	64.4	61.0	58.5
Washington	9.9	12.7	16.9	18.8	20.3
TOTAL	100.0	100.0	100.0	100.0	100.0

(a) Based on estimates shown in Population Prospects, Portland Metropolitan Planning Commission, July 1960.

Table VII
ILLUSTRATIVE DISTRIBUTION OF FUTURE POPULATION, LOWER WILLAMETTE BASIN BY SUB-BASIN

Sub-Basin or Area (a)	Estimated Population, thousands		
	1960	1985	2010
Willamette Main Stem			
All of Multnomah County	523	842	1,438
Clackamas County west of Willamette R.	23	65	124
Clackamas County east of Willamette R. and north of Clackamas R. Basin	38	107	205
Oregon City and Abernethy and Beaver Creek drainage	13	32	60
Tualatin River			
All of Washington County	92	259	500
Clackamas River			
Portion of Clackamas County	22	42	75
Sandy River			
Portion of Clackamas County	3	6	10
Molalla River			
Portion of Clackamas County	10	19	34
Pudding River			
Portion of Clackamas County	4	8	14
TOTAL, LOWER WILLAMETTE BASIN	728	1,380	2,460

(a) For definitions of areas, see footnotes to Table I.

As shown in Table VII, Multnomah and Washington Counties are sub-basin units in themselves, but Clackamas County is divided into seven sub-basins. Without a more detailed study than can be undertaken for this preliminary economic analysis, the allocation of Clackamas County population among these seven sub-basins must be on a rather arbitrary judgmental basis. The principal assumption has been that the portion of Clackamas County west of the Willamette River and the portion east of the Willamette River and north of the Clackamas River Basin will both grow more rapidly than the rest of the county. It has been assumed that the Oregon City area would grow at the average rate for the county, and that the other four portions (Clackamas River, Sandy River, Molalla River, and Pudding River sub-basins) would all grow less rapidly than the county average. In Table VII, the growth rate assigned to the two fastest growing portions was the same as that for Washington County, which is projected to grow more rapidly than the Clackamas County average. The growth rate assigned to the four slower growing portions was the same as that for the entire three-county Lower Willamette Basin. Table VIII shows the rates used for calculation of population estimates in Table VII.

Table VIII
HYPOTHETICAL GROWTH RATES FOR SUB-BASINS OF LOWER WILLAMETTE BASIN

Sub-Basin or Area (a)	Average Annual Rates, Per Cent		As Multiple of 1960 Population	
	1960-85	1985-2010	1985	2010
Willamette Main Stem				
All of Multnomah County	1.9	2.1	1.6	2.7
Clackamas County west of Willamette R.	4.2	2.7	2.8	5.4
Clackamas County east of Willamette R. and north of Clackamas R. Basin	4.2	2.7	2.8	5.4
Oregon City and Abernethy and Beaver Creek drainage	3.7	2.5	2.5	4.6
Tualatin River				
All of Washington County	4.2	2.7	2.8	5.4
Clackamas River				
Portion of Clackamas County	2.6	2.3	1.9	3.4
Sandy River				
Portion of Clackamas County	2.6	2.3	1.9	3.4
Molalla River				
Portion of Clackamas County	2.6	2.3	1.9	3.4
Pudding River				
Portion of Clackamas County	2.6	2.3	1.9	3.4
TOTAL, LOWER WILLAMETTE BASIN	2.6	2.3	1.9	3.4

(a) For definitions of areas, see footnotes to Table I.

No estimates of future population of individual cities in the Lower Willamette Basin are given in this report. As project reviews are required, the outlook for growth in individual cities will be studied. However, until such detailed economic studies are made for specific cities, it may be adequate, for certain design purposes, to assume that the cities in each sub-basin (listed in Table II) will grow at about

the same rate as the sub-basin in which they are located. A first approximation of cities' populations in 1985 and 2010 may, therefore, be calculated by applying to their 1960 population the average annual growth rates or factors for their sub-basin shown in Table VIII.